

Claims

1. A vaccine composition for the treatment of asthma or COPD, comprising an immunogen that is capable of generating an immune response in a vaccinee against self IL-13 and an adjuvant composition comprising a combination of a saponin and a non-toxic derivative of LPS.
2. A vaccine as claimed in claim 1 wherein the immunogen is generates an immune response against human IL-13.
3. A vaccine as claimed in claim 2 wherein the immunogen comprises human IL-13 supplemented with foreign T-helper epitopes.
4. A vaccine as claimed in claim 2 wherein the immunogen that is capable of generating an immune response in a vaccinee against self IL-13 is a chimaeric human IL-13 immunogen.
5. A vaccine as claimed in claim 4, wherein the immunogen comprises a non-human IL-13 backbone, substituted with human IL-13 B cell epitopes.
6. A vaccine as claimed in claim 4 wherein the chimaeric human IL-13 sequence has a similar conformational shape to native human IL-13 whilst having sufficient amino acid sequence diversity to enhance its immunogenicity when administered to a human, characterised in that the chimaeric IL-13 immunogen has the sequence of human IL-13 comprising:
 - (a) substitution mutations in at least two of the following alpha helical regions: PSTALRELIEELVNIT, MYCAALESIL, KTQRMLSGF or AQFVKDLLLHLKKLFRE,
 - (b) comprises in unmutated form at least six of the following regions of high inter-species conservation 3PVP, 12ELIEEL, 19NITQ, 28LCN, 32SMVWS, 50SL, 60AI, 64TQ, 87DTKIEVA, 99LL, 106LF, and
 - (c) optionally comprises a mutation in any of the remaining amino acids, wherein any substitution performed in steps a, b or c is a structurally conservative substitution.
7. A vaccine as claimed in claim 6, wherein the amino acid sequence of human IL-13 comprises conservative substitutions, or substitutions characteristic of amino acids present at equivalent positions within the IL-13 sequence of a non-human species, present in at least six of the following 13 positions 8T, 11R, 18V, 49E, 62K, 66M, 69G, 84H, 97K, 101L, 105K, 109E, 111R.
8. A vaccine as claimed in claim 7 comprising at least 6 of the following substitutions:

Position	Substitution
8	T->S
11	R->K
18	V->A
49	E->D
62	K->R
66	M->I
69	G->A
84	H->R
97	K->T
101	L->V
105	K->R
109	E->Q
111	R->T

9. A vaccine as claimed in claim 4, wherein the IL-13 element is selected from the following group: Immunogen 1, Immunogen 11, Immunogen 12 and Immunogen 13.
10. A vaccine as claimed in claim 4, selected from the following group: Immunogen 2, Immunogen 3, Immunogen 7, Immunogen 8, Immunogen 9 and Immunogen 10.
11. A vaccine as claimed in any one of claims 1 to 10 wherein the saponin is QS21
12. A vaccine as claimed in any one of claims 1 to 10 wherein the non-toxic derivative of LPS is 3D-MPL.
13. A vaccine as claimed in any one of claims 1 to 12 wherein the adjuvant is a combination of QS21 and 3D-MPL.
14. A vaccine as claimed in any one of claims 1 to 13, further comprising an immunostimulatory oligonucleotide.
15. A vaccine as claimed in claim 14, wherein the immunostimulatory oligonucleotide has the sequence TCG TCG TTT TGT CGT TTT GTC GTT (OLIGO 4).
16. A vaccine as claimed in claim 1 wherein the vaccine comprises a human IL-13 immunogen comprising an orthologous IL-13 sequence, wherein at least one of the orthologous B-cell epitopes are substituted for the equivalent human sequences.

17. A method for the manufacture of a vaccine comprising the admixture of an immunogen capable of generating an immune response against IL-13, and a saponin and a non-toxic derivative of IL-13.
18. Use of a vaccine as claimed in any one of claims 1 to 16 in medicine.
19. A method of treating an individual susceptible to or suffering from asthma comprising administering to that individual a vaccine according to any one of claims 1 to 16.